

WHAT IS CLAIMED IS:

1. An optical cross-connect comprising:
  - a plurality of input ports each operable to receive an optical input signal, each input signal comprising a plurality of channels that are each operable to carry optical traffic;
  - a plurality of output ports each operable to output an optical output signal;
  - a distributing amplifier associated with each input port, each distributing amplifier operable to generate a plurality of copies of the input signal received at the associated input port;
  - a plurality of filter units each operable to:
    - receive a copy of one or more of the input signals from one or more of the distributing amplifiers; and
    - forward traffic in selected channels of one or more of the copies; and
  - a combining amplifier associated with each output port, each combining amplifier operable to:
    - receive the traffic in one or more of the channels forwarded by one or more of the filter units; and
    - combine the received traffic into an output signal to be output from the associated output port.
2. The optical cross-connect of Claim 1, wherein the distributing amplifiers each comprise a plurality of passive optical couplers operable to generate the plurality of copies of the associated input signal.
3. The optical cross-connect of Claim 1, wherein the combining amplifiers each comprise a plurality of passive optical couplers operable to combine the received traffic into the associated output signal.
4. The optical cross-connect of Claim 1, wherein the filter units are each operable to forward traffic in one or more selected channels by passing the traffic in selected channels and terminating the traffic in the remaining channels.

5. The optical cross-connect of Claim 1, wherein each filter unit comprises one or more filters, each filter operable to receive a copy of an input signal and to pass the traffic in selected channels and to terminate the traffic in the remaining channels of the particular input signal.

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6. The optical cross-connect of Claim 5, wherein the filters comprise tunable filters.

7. The optical cross-connect of Claim 1, wherein a filter unit is associated  
10 with each output port.

8. The optical cross-connect of Claim 7, wherein a copy of each input signal is forwarded to each filter unit so that any channel of any input signal may be output from any output port.

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9. The optical cross-connect of Claim 1, wherein the filter units are configured so that each combining amplifier receives only non-interfering channels from the filter units.

10. An optical cross-connect comprising:

a plurality of input ports each operable to receive an optical input signal, each input signal comprising a plurality of channels that are each operable to carry optical traffic;

5 a plurality of output ports each operable to output an optical output signal;

a distributing amplifier associated with each input port, each distributing amplifier comprising a plurality of passive optical couplers operable to generate a plurality of copies of the input signal received at the associated input port;

10 a plurality of filter units each comprising a plurality of filters, each filter operable to:

receive a copy of a particular input signal from a distributing amplifier;

forward the traffic in selected channels of the input signal; and

terminate the traffic in the remaining channels of the input signal; and

15 a combining amplifier associated with each output port, each combining amplifier operable to receive the traffic in one or more of the channels forwarded by one or more of the filter units, each combining amplifier comprising a plurality of passive optical couplers operable to combine the received traffic into an output signal to be output from the associated output port.

20 11. The optical cross-connect of Claim 10, wherein the filters comprise tunable filters.

25 12. The optical cross-connect of Claim 10, wherein a filter unit is associated with each output port.

13. The optical cross-connect of Claim 12, wherein a copy of each input signal is forwarded to each filter unit so that any channel of any input signal may be output from any output port.

30 14. The optical cross-connect of Claim 10, wherein the filter units are configured so that each combining amplifier receives only non-interfering channels from the filter units.

15. A method for cross-connecting optical signals, comprising:  
receiving an optical input signal at each of a plurality of input ports, each input  
signal comprising a plurality of channels that are each operable to carry optical traffic;  
generating a plurality of copies of each input signal;  
5 receiving a copy of one or more of the input signals at each of a plurality of  
filter units;  
forwarding traffic in selected channels of one or more of the copies received at  
each filter unit to one or more output ports;  
receiving the traffic in one or more of the channels forwarded by one or more  
10 of the filter units at a plurality of output ports; and  
combining the traffic received at each output port into an optical output signal  
to be output from the output port.
16. The method of Claim 15, wherein the plurality of copies of each input  
15 signal are generated using a plurality of passive optical couplers.
17. The method of Claim 15, wherein the traffic received at each output  
port is combined using a plurality of passive optical couplers.
- 20 18. The method of Claim 15, wherein forwarding the traffic in one or more  
selected channels of a copy of an input optical signal comprises passing the traffic in  
selected channels of the signal and terminating the traffic in the remaining channels of  
the signal.
- 25 19. The method of Claim 15, wherein a filter unit is associated with each  
output port.
20. The method of Claim 19, wherein a copy of each input signal is  
forwarded to each filter unit so that any channel of any input signal may be output  
30 from any output port.

21. The method of Claim 15, wherein only non-interfering channels of different input signals are forwarded to a particular output port.

22. A method for cross-connecting optical signals, comprising:  
receiving an optical input signal at each of a plurality of input ports, each input  
signal comprising a plurality of channels that are each operable to carry optical traffic;  
generating a plurality of copies of each input signal using a plurality of passive  
5 optical couplers;  
receiving a copy of one or more of the input signals at each of a plurality of  
filter units;  
forwarding traffic in selected channels of one or more of the copies received at  
each filter unit to one or more output ports;  
10 receiving the traffic in one or more of the channels forwarded by one or more  
of the filter units at a plurality of output ports; and  
combining the traffic received at each output port into an optical output signal  
to be output from the output port using a plurality of passive optical couplers.

15 23. The method of Claim 22, wherein forwarding the traffic in one or more  
selected channels of a copy of an input optical signal comprises passing the traffic in  
selected channels of the signal and terminating the traffic in the remaining channels of  
the signal.

20 24. The method of Claim 22, wherein a filter unit is associated with each  
output port.

25 25. The method of Claim 24, wherein a copy of each input signal is  
forwarded to each filter unit so that any channel of any input signal may be output  
from any output port.

26. The method of Claim 22, wherein only non-interfering channels of  
different input signals are forwarded to a particular output port.

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27. An optical cross-connect, comprising:

means for receiving a plurality of optical input signals, each input signal comprising a plurality of channels that are each operable to carry optical traffic;

means for generating a plurality of copies of each input signal;

5 means for forwarding traffic in selected channels of one or more of the copies to one or more output ports; and

means for combining the traffic received at each output port into an optical output signal to be output from the output port.